Hydrologic Model Manager

Short Name	WISTOO
Long Name	Mathematical Model of Rainfall-Runoff Transformation
Description	
Model Type	Integral distributed mathematical model. Based on digital GIS thematic layers
Model Objectives	- runoff hydrograph simulation at arbitrary valley cross-section - spatial visualization of hydrological processes - determination of influence of water reservoirs on runoff hydrograph from watershed
Agency _Office	Cracow University of Technology, Warsaw University of Technology
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Model Structure	Integral distributed model based on hydrodynamic equations describing processes: infiltration, surface runoff, subsurface runoff and water transformation in river network. Interception and groundwater runoff are described by simplified formulas. Evapotranspiration process is solved depending on meteorological input data, as Penman-Motheit equation, empirical function or tabular values.
Interception	
Groundwater	
Snowmelt	
Precipitation	
Evapo-transpiration	
Infiltration	
Model Paramters	- state of the terrain and land-use (ex. resistance coefficient - roughness, coverage height, permeability, coverage retention etc.), - soil and sub-soil type: porosity coefficient, maximal soil conductivity, soil depth. Parameters are estimated from digital thematic layers.
Spatial Scale	Optimal spatial scale varies between 10m x 10m and 25m x 25m for one cell (calculation element). Bigger cells for mountainous watersheds cause distortions in digital elevation model. In some cases bigger cells can be used.
Temporal Scale	Basic calculation time step is I hour. For small watersheds IO min. time step can be applied.
Input Requirements	Minimal data set consists of daily precipitation and runoff at watershed closing cross-section. Closing cross-section can be selected arbitrary. Entire meteorological data set contains hourly data of precipitation, air temperature and humidity, wind velocity, and sun radiation.
Computer Requirements	Minimum PC-type with Microsoft Windows 95/NT, Pentium 20OMHz, 128 MB RAM. Display size and graphic card determine quality of results visualization.
Model Output	Output from the model is determined by type of simulation. It can be: - runoff hydrograph for 10 arbitrary selected cross-sections, - spatial visualization of changes of selected hydrological process: - net precipitation (interception), - depth and velocity of water layer on watershed - surface runoff,

	- depth and velocity of water layer in soil - subsurface runoff, - volurnetric soil humidity. - runoff hydrograph in closing cross-section taking into account water reservoir with selected management policy.
Parameter Estimatn Model Calibrtn	Model parameters are estimated from digital thematic layers. Fitting of simulated hydrographs to observed ones is done by soil parameter correction.
Model Testing Verification	Model testing and verification is based on fitting analysis of calculated and observed runoff hydrographs in selected cross-sections.
Model Sensitivity	Model output hydrograph is sensitive to cell size. Cell size should be equal to mean river bed width.
Model Reliabiity	Model is stable; lack of rapid variations in output with major changing parameter values.
Model Application	Model was applied to several mountainous watersheds (from 20 to 500 km2) in Tatra and Beskidy (Middle Karpatian) mountains. Model is useful in determination of high-risk flood plain, influence of land-use changes, water reservoir efficiency, and in visualization of hydrological processes.
Documentation	Entire documentation is available at Cracow University of Technology.
Other Comments	Model can be adopted for wide range of mountainous watersheds.
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Developer	
Technical Contact	
Contact Organization	